this are not provided for in the theory of Clairaut, which tacitly assumes that the forces urging the interior particles are derived from the forces at the upper surface, merely by changing the co-ordinates at the point of action. In the case of a homogeneous planet, the forces acting on the interior particles are not deducible, in the manner supposed, from the forces at the surface.

After showing that the equilibrium of a fluid, entirely at liberty, will not be disturbed by a pressure of the same intensity applied to all the parts of the exterior surface, the author considers the action of the forces upon the particles in the interior parts of the body of the fluid; and shows that although the forces at the surface are universally deducible from the general expressions of the forces of the interior parts, yet the converse of this proposition is not universally true, the former not being always deducible from the latter; a distinction which is not attended to in Clairaut's theory. He then investigates the manner in which these two classes of forces are connected together; establishes a general theorem on the subject; and proceeds to its application to some of the principal problems, relating to the equilibrium of a homogeneous fluid at liberty, and of which the particles attract one another with forces, first in the inverse duplicate ratio, and secondly in the direct ratio of the distance, at the same time that they are urged by a centrifugal force arising from their revolution round an axis. The author concludes with some remarks on Maclaurin's demonstration of the equilibrium of the oblate elliptical spheroid; and on the method of investigation followed in the paper published in the Philosophical Transactions for 1824. In an Appendix the author subjoins some remarks on the manner in which this subject has been treated by M. Poisson.

The reading of a paper was then commenced, entitled, "Experimental Researches in Electricity;" Eighth Series." By Michael Faraday, Esq., D.C.L., F.R.S.

June 12, 1834.

BENJAMIN COLLINS BRODIE, Esq., Vice-President, in the Chair.

A paper was read, entitled, "On the Arcs of certain Parabolic Curves." By Henry Fox Talbot, Esq., M.P., F.R.S.

The general equation to parabolic curves, (namely, $nu = v^n$; where u is the abscissa and v the ordinate,) gives for the arc of the curve an expression which, excepting in a very few instances, is transcendental. But although the length of an arc, considered by itself, cannot be assigned algebraically, yet it frequently happens that the sum of two or more arcs is capable of being so assigned, and sometimes in a very simple manner. The author has found this reduction to take place in so many instances, as to incline him to believe that it may be universally possible, provided the exponent (n) of the ordinate in the equation to the curve is a rational quantity of these reductions: he

gives a great number of examples; but although the processes for that purpose are easy, the difficulty consists wholly in finding the proper method of treating each individual case. The author hopes to lay before the Society, on a future occasion, an account of the principles on which this branch of analysis is founded.

Mr. Faraday's Eighth Series of Experimental Researches in Electricity was resumed and read in continuation.

June 19, 1834.

FRANCIS BAILY, Esq., Vice-President, in the Chair.

The reading of Mr. Faraday's Eighth Series of Experimental Researches in Electricity was resumed and concluded.

This series is devoted to an investigation of the source, character and conditions of the electricity of the voltaic instrument, and is divided into five parts. In the first part, simple voltaic circles are considered; and at the outset, the great question of "whether the electricity is due to contact or chemical action?" is investigated and decided by apparently very conclusive evidence in favour of the latter. One principal experiment in favour of this decision is the following: A plate of zinc and a plate of platina were prepared; one end of each of these was put into a vessel containing a little dilute sulphuric acid or sulpho-nitric acid, and between the other ends was placed a piece of bibulous paper moistened in a solution of iodide of potassium: the two plates did not touch each other anywhere, but still the action of the end at the one extremity was able to induce the electro-chemical decomposition of the iodide of potassium at the other. That this decomposition was due to the chemical action of the acid was proved by removing the latter; for then the decomposition ceased. It was also farther proved by the appearance of the iodine against the *platina*; for it went there in consequence of the passage of a current (induced by the action of the acid) having the opposite direction to that which the solution of iodide would have produced had it been the only exciting body, and metallic contact had been allowed.

The opposition of the chemical affinities at the two places where the acid and the solution of the iodide are placed, is shown when the metal plates are allowed to touch each other in the middle; for then two opposite electric currents are produced, but that occasioned by the acid is the stronger. This opposition is farther shown in the manner in which the weaker set of affinities are overcome by the stronger (that is, those of the iodide and zinc by those of the acid and zinc); and this dependence and relation of the two explains at once the value of metallic contact; for if the solution of iodide of potassium be placed between platina and platina, one of those pieces of metal touching the zinc which is immersed in the acid, then the solution of iodide does not tend to throw an electric current into circulation, because it exerts no chemical action in either direction; and therefore